June 1955 · 15c

THE

Johns Hopkins

MAGAZINE

IN THIS ISSUE

Diving Scientists

THE SUMMER
at Johns Hopkins

JUNE 14, TUESDAY—Commencement exercises at 10 a.m. Dag Hammarskjold, secretary general of the United Nations, will be the speaker.

JUNE 20, MONDAY—Instruction begins in general biology and chemistry, summer session.

JUNE 25, SATURDAY—Last day of registration for summer session, 9 a.m. to 12 noon.

JUNE 27, MONDAY—Instruction begins in the summer session.

JULY 4, MONDAY—Independence Day; classes will be suspended and University offices closed.

AUGUST 8–11, MONDAY THROUGH THURSDAY—The School of Advanced International Studies' conference on South and Southeast Asia, in Washington.

THE Johns Hopkins MAGAZINE

VOLUME VI June, 1955 NUMBER 9

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THE YEAR IN HOPKINS SPORTS.....COVER III

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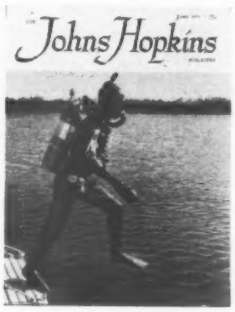
The Cover: Clad in a watertight, temperature-resistant rubber suit, a scientist of the Johns Hopkins University's Chesapeake Bay Institute steps from the side of a boat and into the icy water of one of the Bay's tributaries. He will drop down to the river floor, where he will make face-to-face studies of marine life and inspect conditions on the muddy bottom. His findings, and those of his colleagues, will add to knowledge of the factors that affect the well-being of the important Chesapeake Bay oyster industry. A review of the divers' techniques and research begins on page 4 of this issue.

PHOTOGRAPH BY WERNER WOLFF, BLACK STAR



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The Revolution In DRUG THERAPY

By E. KENNERLY MARSHALL, JR.

After more than four decades of teaching and research, Dr. Marshall, professor of pharmacology and experimental therapeutics at the Johns Hopkins School of Medicine, will retire at the end of this month.

THE treatment of disease with chemicals or drugs is not new; it is as old as the history of man. From the earliest times man seems to have taken by mouth (and would probably have given himself hypodermic injections, had he had a syringe) every product of nature which was soluble or easily reduced to a powder. This procedure led to the introduction of a number of valuable remedies. Castor oil as a purgative and pomegranate for intestinal worms are mentioned in the Ebers Papyrus, the oldest medical document (1550 B.C.). Both of these are in use today, thirty-five centuries later. Trial and error also led to the introduction of valuable drugs—cinchona bark (quinine) for intermittent fevers (malaria), ipecac (emetine) for amoebic dysentery, digitalis for heart disease, opium (morphine) for pain, and many other useful remedies.

However, with possibly two exceptions all of these drugs were what can be called symptomatic remedies—drugs which suppress the disagreeable manifestations of disease but do nothing to remove the cause of the disease. In contrast, we have drugs which can be spoken of as etiological agents or curative agents—drugs which in one way or another remove the cause of a disease. The advances in the last half-century in better symptomatic drugs and especially curative drugs have made the lot of the sick person today immeasurably improved. One might almost guess that in another half-century physicians may indeed be curing their patients "safely, quickly and pleasantly."

This revolution in drug therapy may be illustrated by a survey of the experience of the author. He started to teach pharmacology (or the study of the effect of drugs on living matter) in the fall of 1914. He is now teaching and doing research in pharmacology four decades later. What have been the changes in drug therapy in these four decades?

IN 1914, we had, as etiological or curative drugs, quinine for malaria; ipecac (emetine) for amoebic dysentery; thyroid powder for hypothyroid conditions; many century-old drugs to use as anthelmintics for removal of intestinal worms; Ehrlich's new synthetic arsenical, Salvarsan, just appearing for the cure of syphilis; and the mysterious substances known as vitamins beginning to be the scientific talk of the day. Of course, such symptomatic remedies as digitalis for heart disease, salicylates for rheumatic fever, morphine for pain, atropine for spastic conditions, and a few other drugs were of established value. Our anesthetics were limited to nitrous oxide and ether, chloroform being outlawed on account of its dangers.

Today, in 1955, an entirely different drug therapy exists, in fact so different from four decades before that one can truthfully say a revolution has occurred. Disregarding for the moment the important advances that have occurred in symptomatic therapy, we can state that the advances in etiological or curative therapy have been along three main lines: (1) replacement therapy with hormones; (2) replacement therapy with vitamins; and (3) chemotherapy.

None of these three lines of advance in curative therapy is new; all three have their roots in the past. That replacement therapy with hormones would be highly effective was clearly demonstrated by some experiments carried out in 1849 by Berthold, Professor of Physiology at Göttingen. He removed the testicles from roosters, making them capons. Into one-half of these sexless birds, a testicle was planted in the abdomen. These latter birds remained male in all ways: combs and wattles grew bright red, hens were chased, and battles were fought. The capons lacked all male qualities. Berthold reported his results in a short, four-page article and drew the correct conclusion that the testes secreted into the blood some chemical substance which affected the "consensus partium" of the body. Here was clearly, at least in animals, the start of replacement therapy with hormones, substances secreted into the blood from the ductless or endocrine glands.

NEARLY one hundred years were to elapse before the male sex hormone, testosterone, was isolated from the testes in pure form and used therapeutically

as replacement therapy. Actually, the first use of replacement hormone therapy in man was with thyroid gland. In 1882, Sir Victor Horsley proved the thyroid to be a gland of internal secretion, deficiency of the secretion causing cretinism and myxedema. In 1891, Murray in England showed that injection of a glycerine extract of thyroid could cure myxedema and it was soon found that equally good results could be obtained by oral administration of dried thyroid powder. From these beginnings in 1849 and 1891 of substitution or replacement therapy with hormones, we can briefly trace the developments of the past four decades.

It was not until the early twenties that the next advance came; but when it did arrive it was a dramatic and sensational one: the introduction of insulin for the control of diabetes by means of replacement therapy. The story of insulin is too well known to be told again. Next a disease discovered in the same year as Berthold's discovery of the internal secretion of the testes, and known (after its discoverer) as Addison's disease, yielded to replacement therapy. The disease is due to an insufficiency of the secretion of the adrenals, little glands sitting like cocked hats over each kidney. All victims died. Now, preparations have been made from the adrenal glands which allow an individual with this disease to have a normal life expectancy. The hormones of that little gland at the base of the brain—the pituitary—are now used in therapy. These, with the male sex hormone and its counterpart, the female sex hormones, more or less complete the major advances in replacement hormone therapy.

CURATIVE or replacement therapy with what we now call a vitamin is even older than that with a hormone. James Lind's historic trial of the value of oranges and lemons in controlling scurvy occurred in 1747 aboard H.M.S. *Salisbury*. This study, published in 1753, was so carefully planned and gave such a clear proof of the value of fruit in curing scurvy that we can take it as a start of replacement therapy with vitamins. However, it was not until 1795, the year after Lind died, that lemon juice was issued to ships of the Royal Navy.

Beriberi, a disease characterized by multiple neuritis, serous effusions, edema, muscular atrophy, and cardiovascular changes, was prevalent in rice-eating countries during the latter half of the nineteenth century. The Japanese Navy was rife with the disease in the eighties. A change in diet almost caused the disease to disappear. Eijkman, a prison physician in Java, found that a condition similar to the polyneuritis of beriberi could be produced in pigeons by feeding them polished rice. In addition, he found that the disease could be prevented or cured by giving the birds small quantities of the rice polishings or extracts of the rice polishings. Here, again, was experimental proof of a nutritional disease—a disease due to a deficiency of something in the diet.

Some years later, Sir Frederick Gowland Hopkins showed that mice failed to grow and died on a purified diet containing all the then-known food requirements, but grew and survived if a minute quantity of milk was added to the diet. He concluded correctly that some substances in small amounts were necessary for proper nutrition, and called them accessory food factors. This name was later changed to vitamins.

A dozen or more vitamins are now known to be essential for the proper nutrition and functioning of the human body. Many of these have been obtained in pure crystalline form. Thiamine or B_1 has completely conquered beriberi; ascorbic acid has eliminated scurvy; niacin has removed pellagra; and calciferol or Vitamin D has made it difficult or impossible to show students the disease of rickets. Cyanocobalamin or B_{12} has completely reversed the prognosis of the formerly invariably fatal disease, pernicious anemia. Now, a dosage as small as one microgram a day allows the victims of this disease to lead a life of normal expectancy. One microgram is the size of one twenty thousandth of a grain of rice.

THE third line of advance in curative therapy is chemotherapy. Chemotherapy may be defined as the treatment of an infectious or parasitic disease by a chemical or drug which is sufficiently toxic to the parasite to cause its disappearance without unduly harming the host. Parasites may be roughly classified on the basis of size from large to small: worms, which infest the intestinal tract and certain organs of the body; fungi; protozoa or one-celled animals; bacteria; spirochetes; rickettsia; and viruses. Curiously, the ease with which parasites are eliminated from the human body seems to vary roughly with their size. Thus, effective worm medicines or anthelmintics date back almost to the dawn of civilization. Again, there were many effective remedies for diseases caused by protozoa when none was available for the diseases caused by bacteria or viruses. Even today, drugs are known to be effective against intracellular rickettsia, but none against the small viruses.

The use of cinchona bark (containing quinine) and ipecac (containing emetin) for the treatment of malaria and dysentery dates back to the seventeenth century. These remedies had been discovered accidentally, had been introduced into Europe from South America by the Jesuits, and were used with no knowledge of the causes of the diseases or of the mode of action of the drugs in relieving symptoms. They can be considered as the first real chemotherapeutic agents to be used in therapy. However, the idea of developing specific drugs for the treatment of infections is not new. Thus, Koch, the so-called father of bacteriology, attempted in the last century to cure anthrax disease in guinea pigs by the injection of mercury salts. The attempt was a failure, as were many attempts of this era to use

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In fifty years, the lot of the sick person has improved immeasurably. Here, in review, is a half-century of remarkable progress

DIVING SCIENTISTS

Chemists and physicists of the Chesapeake Bay Institute are conducting face-to-face studies of marine life in its habitat, the bottom of the Bay

By EDGAR L. JONES

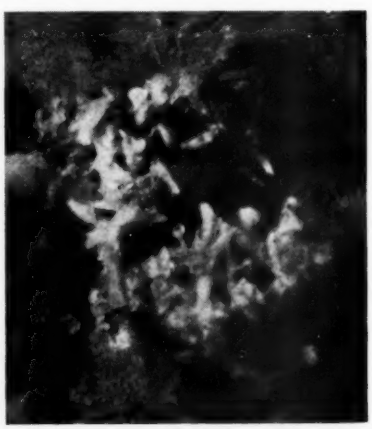
THE scientific and practical study of the American oyster by the Johns Hopkins University began in 1878 with the discovery by Professor William K. Brooks that the American oyster, unlike that of northern Europe, breeds its young by disseminating eggs in surrounding waters, where fertilization and development take place on a grossly hit-or-miss basis. The more efficient European oyster, in contrast, holds its eggs in its gills until they are fertilized and almost ready to "set."

Dr. Brooks, Henry Walters professor of zoology, was the first to fertilize American oyster eggs artificially and to study the development of the embryo. His book on the subject, entitled simply *The Oyster* and published by the University in 1901, remains a classic in its field. In it, Professor Brooks decried the depletion of the natural oyster beds in the Chesapeake Bay, which he surveyed as a Maryland oyster commissioner in 1882 and 1883, and spelled out the steps necessary to "farm" the barren bay bottoms and restore oyster productivity.

More than forty-five years later the Bowman Commission, headed by the late University president, Isaiah Bowman, was urging upon the State much the same policies recommended by Professor Brooks. But by that time the depletion which Dr. Brooks had seen coming was a dismal reality. Oyster production had dropped from a high of more than fifteen million bushels a year to less than two and a half million, and most of the latter-day yield was from the tributaries. The once-famous beds in the Bay proper were denuded.

Dr. Bowman represented the continuing Hopkins interest in the Chesapeake Bay not only as Maryland's greatest natural resource but also as one of the richest agricultural regions to be found anywhere on this globe. A two-hundred-mile-long body of protected water in a favorable climate, the Bay is on the receiving end of all the nutrients washed by the Susquehanna and lesser rivers from thousands of square miles of farmland and hillsides.

THE Chesapeake Bay has everything needed to produce plant life in abundance, and in the oyster it has the greatest little converter of plant life to meat extant. Given a chance, on a pound-for-pound, acre-for-acre basis the oyster can lick its weight in beef steer or any other animal as a meat producer. And this is especially true in the Chesapeake. Whereas in more southern waters the oyster grows rapidly but has a low ratio of meat to shell, and in more northern waters the oyster has a high ratio of meat to shell but grows slowly, the Chesapeake Bay oyster represents the happy medium.



CHESAPEAKE BAY INSTITUTE

On bottom of the Chesapeake, a cluttered, silted oyster bed.

Yet the dream of farming the Bay bottom with the same care given to equivalent areas of good bottom land, the dream held by Brooks, Bowman, and the contemporary scientists of the region, has come to naught—in Maryland, at least. Virginia does some oyster farming at its end of the Bay, but in Maryland, oyster cultivation is governed more by political considerations than by scientific ones.

THE scientists, however, have not given up. On the contrary, they are pushing ever deeper into the fundamentals of bay productivity as members of or in conjunction with the Chesapeake Bay Institute of the Johns Hopkins University. Organized in 1948—through the persuasive power, in part, of Dr. Bowman—and jointly financed by Maryland, Virginia, and the United States Navy, the Institute is slowly pinning down the chemical and physical aspects of the Bay and their relationship to plant and animal growth.

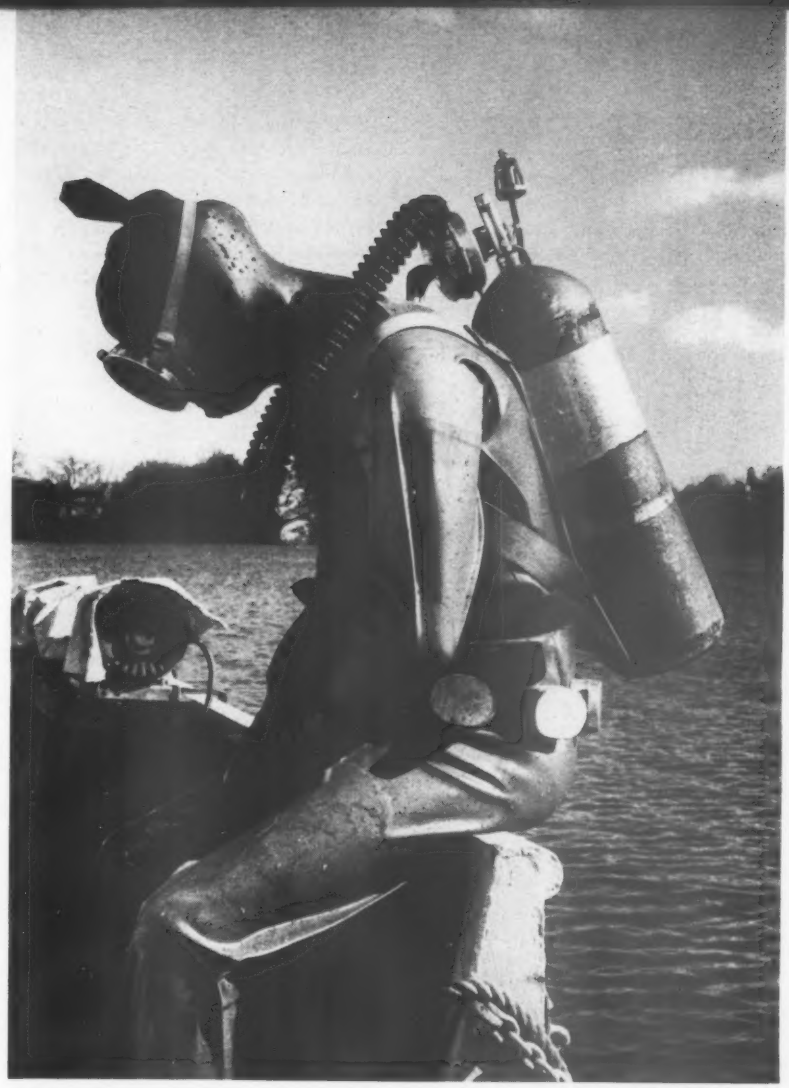
The late Dr. Brooks and those who followed him learned a great deal about the Chesapeake oyster, but little about its environment. They knew that oysters grew well in some regions and not in others; that the eggs were cast to the currents to be gobbled up by fish or, perchance, to be fertilized; and that the larvae in their free-swimming stage found a favorable "setting" place in some years and not in others. But the determining factors were not known.

The environmental studies being carried out by the Chesapeake Bay Institute serve the marine fisheries in the same way that studies in soil chemistry, meteorology, and climatology serve dry-land farming. The Hopkins Institute is trying to fill in the great gaps of man's knowledge of an estuarial environment: speed and direction of currents, variations in temperatures, salinity, and oxygen content at various locations during different seasons of the year, the depth of sunlight penetration, productivity of plankton, presence or absence of trace elements, and all the other factors aiding or inhibiting growth.

THE job of pinning down an environment constantly in motion is a tremendous one. The Chesapeake Bay has river and tidal currents, wind currents, and what might best be called salinity currents—the motion set up as salt is picked up by fresh water flowing out along the surface and is replaced by the ocean waters flowing in along the bottom. A wet spring in New York State, a dry and hot summer in Maryland, a strong wind from the east, and an unusually cold winter all have bearing on the chemical consistency of bay waters.

To adapt oceanography to the study of an estuary, the twelve-man research staff under the direction of Donald W. Pritchard has had to turn to its own machine shop for much of its equipment, from water samplers to current-measuring instruments. Operating from a sixty-five-foot floating laboratory, the motor cruiser *Maury*, and from smaller craft, the men have methodically made their measurements throughout the Bay at all depths during all seasons of not just one but half a dozen years.

The charts, graphs, and tables which are the cumulative result of the Institute's painstaking operations have bearing, of course, on more than oyster cultivation. They have bearing on the migratory movements of crabs, the spawning of shad, the productivity of rock and other commercial fin fish, and all other facets of the extensive Maryland-Virginia seafood industry. And as far as the Navy is concerned, the data garnered by the Institute has a significance far removed from the life cycles of shell and fin fish. Much of the same basic data on current velocities, temperature and salinity distribution, and bottom studies which aid in marine-life research also serve in the solution of problems of importance to naval operations.



WERNER WOLFF, BLACK STAR

Exhausted from the exertion of a dive, a Chesapeake Bay Institute scientist rests on shipboard. Breastplate holds flashbulbs.

BUT bay research, however broad in scope, has a way of returning again and again to oyster problems. Why, Virginians asked, should the best seed-beds in the James River be twelve to twenty-four miles above the brood beds? How can larvae get upstream against the current? The answer, the Institute has found, is that below a depth of ten feet the James River water flows in instead of out, carrying the larvae upstream with it.

Why, Marylanders asked, are some of the seed beds in St. Mary's River so bountiful and others so sparse? Again, the Institute found currents to be the answer: salinity currents which kept the larvae in the river at one location, wind currents which swept them out of the river at another location.

Studying oyster cultivation from a boat is, however, in Dr. Pritchard's words, comparable to trying to learn the nature of the potato or some other land plant by studying it from a balloon bobbing high above a cloud bank. The

DIVING SCIENTISTS
Continued

man in the boat can grapple for his subject, examine it in a laboratory, take samplings of the mud beneath it and the waters above it, but he still is not acquainted with the oyster as it lies undisturbed in its own environment.

So for more than a year now, Dr. Pritchard and four of his researchers have been supplementing their soundings and samplings with face-to-face studies of oysters in their native habitat, the murky bottom of the Bay. Equipped with the fins, face masks, and oxygen tanks that are the insignia of frogmen, the diving chemists and physicists have been seeing for themselves the type of bottoms on which oysters thrive, to what extent the oysters remain submerged in mud, exactly how often and how hard they "pump," and the ratio of live ones to empty shells.

Gone now is the guesswork involved in lowering an instrument to get what a scientist can only hope is a sample of water just a few inches off the bottom. In such a blind test the sampling device may actually be partially submerged in soft mud, or the bottom may have been stirred up so much in groping for it that no true water sample can be obtained. But when the divers go down with samplers, as they have in the Rappahannock, and bring back water which proves to be low in oxygen content, the Institute has dependable data to offer in explanations of oyster mortality.

THE Hopkins men have had to improvise and develop new techniques in their diving, as in all other aspects of their work. The Chesapeake Bay is muddy, so much so that the Institute had to devise a self-reeling line to keep divers in touch with each other and the boat. The Chesapeake Bay is also bitterly cold in winter, so cold that a diver's sinuses begin to throb in a matter of seconds when his only protection is the conventional type of foam-rubber suit. To get around this, the Institute has designed a snug-fitting helmet which gives its divers a knight-like appearance and allows them to stay down in the bitterest of weather.

With their foam-rubber suits, hoods, goggles, oxygen equipment, flippers, guide reels, depth gauges, flashlights, and scientific instruments, the fact-finding frogmen were at the bottom of the Bay late in the fall, surveying the effects of Hurricane Hazel on the oyster beds. They were down repeatedly in February, during the coldest spell of the entire winter, determining whether harmful sedimentation was resulting from the construction of a motor vehicular tunnel at the mouth of the James River.

Bulky and tiring as the protective clothing is, the Institute divers find it necessary even in summer, because poisonous sea nettles are encountered at nearly all depths in the Bay during the warm season. Occasionally, in fact, diving operations have to be suspended altogether in late summer, the sea nettles are so numerous.

WHAT does it feel like at the bottom of Chesapeake Bay? Under ideal weather conditions, with bay waters warm and reasonably settled, the frogmen can see as far as twenty feet in all directions, and diving is a pleasure. In such circumstances a diver has natural light down to forty feet, which is deep enough for most bay research; he can see the bottom, knows where he is going, and can do his job easily and quickly. But such days are rare in Chesapeake waters.

Usually the Institute men work in water so turbid that visibility is limited to a few feet and sometimes to as little as three inches. At fifteen feet down, there is still sunlight but it has no "direction." At twenty feet it is pitch dark and more difficult to work in than a dark room, because in this laboratory even the floor must be found by groping. At times, the only way the men can tell which way is up is by feeling around in the blackness to determine the direction their own air bubbles are taking.

During the initial diving experiments the men found themselves getting badly ensnared in their own ropes, ropes which they couldn't see to unwind from their legs and bodies. Now the self-winding reels which they attach to their belts keep the line taut between divers, who frequently work in pairs in the bottom-sweeping operations, and also between divers and a weighted line lowered from the boat.

The customary procedure under turbid conditions is for a diver to lower himself down the weighted line, stopping periodically to check the depth gauge on his wrist. This alone is a time-consuming procedure, because the diver must grope around for his flashlight, bring it and the gauge up to within a few inches of

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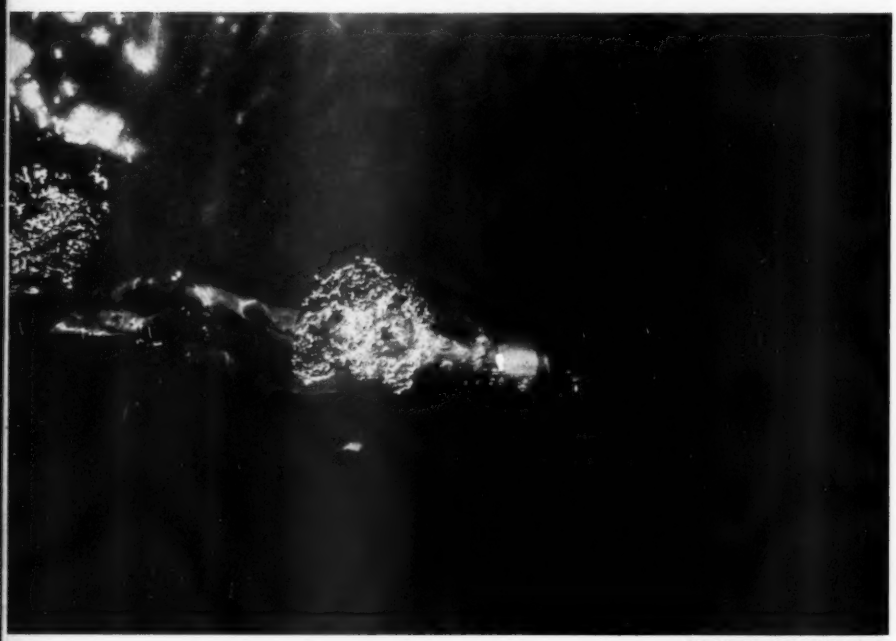


WERNER WOLFF, BLACK STAR

On his way down to the bottom of a river to explore marine life, a scientist dives in knight-like suit designed at the Institute.

A patient undergoes a perimetry examination to discover areas of impaired vision.

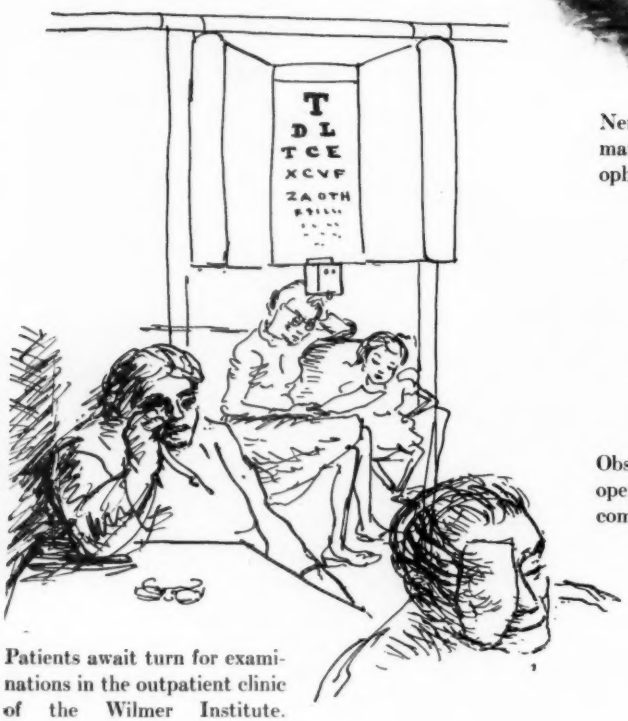
THE WILMER INSTITUTE

Drawings by AARON SOPHER

THE Wilmer Institute is the ophthalmological division of the Johns Hopkins Hospital. Recently Aaron Sopher recorded his impressions of the activities, from waiting room to operating room, that take place there. On the following pages are selections from his sketchbook.

THE WILMER INSTITUTE
Continued

Nervous non-ocular diseases, manifested in eyes, show up in ophthalmoscope examination.



Patients await turn for examinations in the outpatient clinic of the Wilmer Institute.

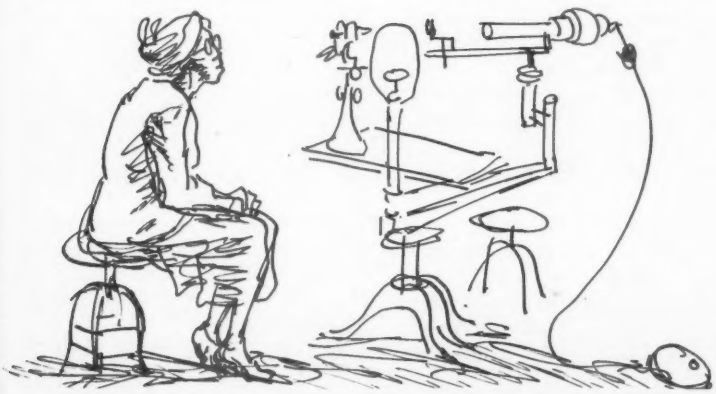
Observers closely watch an operating team as it performs a complex corneal transplanting.

Trying to read the letters on a chart, this patient is being tested for her visual acuity.

Wilmer Institute artist Mrs. Annette Smith Burgess, draws eyes for permanent records.

Using a cheiroscope, an orthoptist tests a child to determine if one eye is "suppressed."

A patient sits beside a slit-lamp which is used to examine the anterior segment of eye.



Bandages do not prevent this post-operative patient from enjoying the scent of summer. ➤

A Johns Hopkins Gazette

AN UNOFFICIAL COMPENDIUM OF FACULTY AND ALUMNI APPOINTMENTS, HONORS, AND ACCOMPLISHMENTS

Two major units of the Johns Hopkins Homewood campus will be named in honor of two benefactors of the University, William Keyser and William Wyman, the University's trustees recently decided. The Keyser name will be given to the upper quadrangle formed by Gilman, Ames, Rowland, Remsen, and Mergenthaler Halls. The lower quadrangle framed by Shriver, Maryland, and Latrobe Halls will be named for Mr. Wyman. One hundred forty-five acres of land were given to the University by the two men in 1902 to provide the growing student body, then centered in downtown Baltimore, with a suburban campus.

MOVING

BILL BICKNELL

Johns Hopkins

JOHNS HOPKINS, in bronze, has been moved from his familiar site in the middle of Baltimore's North Charles Street, opposite the Homewood campus of the University. Having been situated in this spot since 1935, the Hopkins bust —with two companions, a man representing a student in thought and a woman representing medicine—was evicted in the interest of greater traffic safety and flow. The monument was done for Baltimore's Municipal Art Society by the late Hans Schuler at a cost of around twenty thousand dollars. The city is moving it to a spot on the east edge of the Hopkins campus, facing Charles Street at Thirty-third, at a cost of around fifty thousand dollars.

THE ALUMNI

Morris A. Soper, B.A. '93, LL.D. (hon.) '53, has asked to be retired from active service on the United States Court of Appeals for the Fourth Judicial Circuit, effective June 2. This date will mark his sixtieth year at the bar; forty of these years have been spent as a state or federal judge.

Harry N. Holmes, PH.D. '07, who has been head of the chemistry department at Oberlin College for thirty-one years, has been awarded the James Flach Norris Award of the Northeastern Section of the American Chemical Society for 1955. The award was made "for outstanding achievement in the teaching of chemistry."

J. B. Reeside, Jr., B.A. '11, PH.D. '15 (Geology), has been elected vice president of the Cushman Foundation for Foraminiferal Research.

Ernest William Goodpasture, M.D. '12, FEL. '12–'13, House Staff '13–'15, has been appointed scientific director of the newly activated department of pathology at the Armed Forces Institute of Pathology.

Robert L. Levy, M.D. '13, House Staff '13–'17, FAC. '16–'19 (Medicine), has been elected vice president of the New York Academy of Medicine.

Hugh L. Dryden, B.A. '16, M.A. '18, PH.D. '19 (Physics), LL.D. (hon.) '53, director of the National Advisory Committee for Aeronautics, has been awarded an honorary doctor of engineering degree by the University of Maryland.

Howard P. Doub, M.D. '17, has been elected librarian of the Radiological Society of North America.

J. Burns Amberson, Jr., M.D. '17, has been elected vice president of the New York Academy of Medicine.

Walter L. Taylor, Jr., B.A. '18, has been elected general counsel of the Maryland Casualty Company.

W. J. Merle Scott, M.D. '18, has been appointed professor of surgery and chairman of the department of surgery at the University of Rochester School of Medicine and Dentistry; he has also been appointed surgeon-in-chief of Strong Memorial Hospital. He succeeds John J. Morton, Jr., M.D. '13, who became professor emeritus of surgery in 1953.

J. Edward Hoffmeister, B.A. '20, PH.D. '23 (Geology), has been elected treasurer of the Geological Society of America.

C. Sidney Burwell, House Staff '21–'22 (Medicine), FAC. '21–'24, has been appointed Samuel A. Levine professor of medicine at Harvard Medical School.

Wiley D. Forbus, M.D. '23, has been named to the Duke University council on gerontology.

Leslie B. Schwinn, '23–'26 (Arts), has

been elected a member of the board of governors of the Midwest Stock Exchange in Chicago.

Bayard Carter, M.D. '25, has been named to the Duke University council on gerontology.

Jean C. Brawner, B.S. '28 (Economics), has been named senior vice president and treasurer of National Air Lines.

J. Wallace Joyce, B.E. '28, PH.D. '31 (Electrical Engineering), G. '31–'32 (Geology), heads the newly established National Science Foundation Office for the International Geophysical Year.

Leo Berberich, B.E. '28, DR. ENG. '31 (Electrical), has received an award of $2,500 for his part in inventing thermalastic insulation for the coils of high voltage turbine generators.

Frank N. Trager, G. '28–'33 (Philosophy), FAC. '28–'34, has been appointed research professor in the department of government at New York University.

Arthur E. Gordon, PH.D. '29 (Latin), professor of Latin and chairman of the classics department at the University of California (Berkeley), has been awarded a Guggenheim Fellowship for epigraphical research in Italy and Greece.

Henry B. Makover, B.A. '29, M.D. '33, has been appointed professor of preventive and environmental medicine in the Albert Einstein College of Medicine, New York.

Milton H. Medenbach, B.A. '29, has been appointed a brigadier general in the Pennsylvania National Guard.

Jefferson D. Blackwell, PH.D. '29 (Education), retires this month as president of Maryland State Teachers College in Salisbury, a post which he has held since 1935.

Charles M. Gray, M.D. '30, has been elected vice president of the Radiological Society of North America.

Barnes Woodhall, M.D. '30, has been named to the Duke University council on gerontology.

Eric F. Goldman, '31–'32 (Arts), M.A. '35, PH.D. '38, FAC. '38–'42 (History), has been promoted to the position of professor of history at Princeton University.

Forest K. Harris, PH.D. '32 (Physics and Electrical Engineering) has been awarded the Silver Medal for meritorious service from the Department of Commerce in recognition of his accomplishments in electrical instrumentation and measurements and for authorship of a book on electrical measurements.

Wyland F. Leadbetter, M.D. '32, FAC. '33–'38, has been appointed associate clinical professor of surgery at the Harvard Medical School, and as chief of the urological service at the Massachusetts General Hospital.

KIDNAPED

DICK WALTERS

The Navy Goat

BILLY XIV was displayed by Johns Hopkins men as a prize of war at the Hopkins-Navy Homecoming Day lacrosse game last month. Billy had been kidnaped from a farm near Annapolis several nights before the game. But his presence on the Hopkins side of the field was one of the few cheer-provoking events of the afternoon. The Hopkins team lost to the Naval Academy, 13 to 3.

THE FACULTY

IN THE FACULTY OF PHILOSOPHY, William F. Albright, Spence professor of Semitic languages, has been elected to membership in the National Academy of Sciences. Professor Albright is the second specialist in archaeology and ancient old-world history to be elected to membership in the National Academy. The first was James Henry Breasted, who died in 1935.

Charles R. Anderson, professor of English, has been named advisory editor of a "Journal of American Studies" to be published twice a year in Japan.

Frank R. Blake will retire and will become professor emeritus of the Oriental Seminary, effective June 30.

Evsey D. Domar has been promoted to professor of political economy.

Leon Ehrenpreis has been promoted to assistant professor of mathematics, effective July 1.

Paul H. Emmett has been appointed professor of chemistry and first holder of the Grace Chair of Chemistry at Johns Hopkins. Dr. Emmett was professor of chemistry and gas engineering at the University from 1937 to 1944, when he left to become a fellow of the Mellon Institute of Industrial Research. He has just been elected a member of the National Academy of Sciences.

Wendell R. Garner has been promoted to professor of psychology, effective July 1.

H. Bentley Glass, professor of biology, was chosen by the State Department as a delegate to the Twelfth General Assembly of the International Union of Biological Societies in Rome.

Albert L. Hammond has been promoted to associate professor of philosophy, effective July 1.

Thomas R. Hart, Jr., has been appointed assistant professor of Romance languages.

Clifford A. Hopson has been appointed assistant professor of geology, effective July 1.

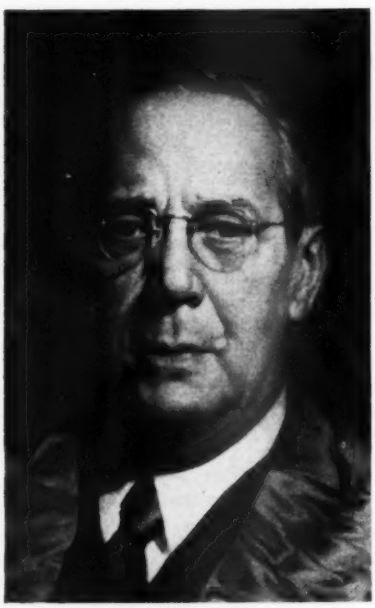
Frederic C. Lane, professor of history, has been elected to membership in the American Philosophical Society.

Douglas H. K. Lee, professor of physiological climatology, was sent to South America by the Food and Agricul-

RETIRING

BRADFORD BACHRACH

Anna D. Wolf
Director, School of Nursing



Alan C. Woods
Professor of Ophthalmology

tural Organization of the United Nations to examine facilities for high-altitude research in Peru, and to attend the inter-American meeting on animal production in Buenos Aires.

Fritz Machlup, Hutzler professor of political economy, has been granted a leave of absence to be visiting professor at Kyoto and Doshisha Universities in Japan. He will also be director of the Kyoto American Studies Seminar, a combined institute of these two universities and the University of Michigan.

Elmer V. McCollum, professor emeritus of biochemistry, has been awarded the Osborne and Mendel Award of the American Institute of Nutrition for his research in nutrition.

Alex Nickon has been appointed assistant professor of chemistry.

Dean W. Robinson has been appointed assistant professor of chemistry.

Ernest F. Penrose, Griswold professor of geography and international relations, has been granted a leave of absence to conduct research in economics and political geography at Australian National University.

Theodore O. Sippel has been promoted to assistant professor of biology.

Leo Spitzer, professor emeritus of Romance philology, has been awarded the Feltrinelli Prize of five million lire ($8,000) by the Academia Nazionale dei Lincei in Rome. The prize is given biennially, on an international basis, to a scholar of philology or literary history.

Benjamin H. Willier, Walters professor of zoology, has been elected to membership in the American Philosophical Society.

IN THE SCHOOL OF ENGINEERING, Lloyd O. Brown has been appointed assistant professor of electrical engineering.

IN THE SCHOOL OF MEDICINE, C. Bernard Brack was erroneously listed as assistant professor of gynecology in the April issue; he is associate professor of gynecology.

Robert K. Burns, honorary professor of zoology and staff member of the Carnegie Institution's department of embryology (located at the School of Medicine), has been elected to the National Academy of Sciences.

Emil Novak, assistant professor emeritus of gynecology, has been awarded an honorary fellowship in the Royal Society of Medicine of Great Britain. The honor is limited to a hundred members.

Lawson Wilkins, associate professor of pediatrics, has been given the 1955 Modern Medicine award for distinguished achievement. He was cited for his application of advances in endocrinology to childhood diseases.

IN THE SCHOOL OF HYGIENE AND PUBLIC HEALTH, Reubin Andres has been promoted to the rank of assistant professor of environmental medicine, effective July 1.

Clark P. Read has been promoted to associate professor of parasitology, effective July 1.

Richard H. Shepard has been appointed to the rank of assistant professor of environmental medicine, effective July 1.

AT THE APPLIED PHYSICS LABORATORY, Felix Falk, B.A. '51, has been appointed to the senior staff.

DEATHS

Herbert Williams Allen, M.D. '00, House Staff '00–'01 (Medicine), April 21, 1955.

James Cornelius Barbour, G. '04–'05, '07–'09 (Chemistry), March 10, 1955.

Helen Margaret Bassett, Graduate Nurse '37, January 15, 1955.

Ethel Bowman, FEL. '22–'23, '27–'28 (Psychology), '30–'31 (Philosophy), April 8, 1955.

Hugh McCulloh Branham, '04–'06 (Arts), March 11, 1955.

Paul Ernest Brown, M.D. '20, House Staff '21–'22 (Obstetrics), June 9, 1954.

Riggin Buckler, B.A. '05, April 27, 1955.

James D. Carter, House Staff '45–'50, FAC. '50–'52 (Psychiatry), April 23, 1955.

Thomas D. Caulfield, M.E. '49 (Electrical), March 6, 1955.

Louis Albert Chase, '98–'99 (Medicine), December 21, 1954.

Clyde Alvin Clapp, associate professor emeritus of ophthalmology, April 9, 1955.

Clarence Garfield Cooper, '08–'09 (Arts), G. '23–'24, '25–'26, '28–'29 (Education), March 19, 1955.

Melville D. Dickinson, Jr., M.P.H. '48, December 20, 1954.

James F. Didusch, Medical Arts '10–'13, associate professor of art as applied to medicine '40–'43, March 16, 1955.

Edward Cyril Donohoe, B.A. '21, February 17, 1954.

Emma Lootz (Mrs. William G.) Erving, M.D. '02, February 23, 1955.

Roades Fayerweather, M.D. '03, FAC. '08–'20, February 1, 1955.

William Parker Finney, Jr., G. '11–'12 (Biology), M.D. '16, FAC. '18–'19, March 29, 1955.

Charles C. Freeman, G. '93–'94 (Chemistry), February 3, 1953.

LeRoy Gresham, G. '93–'94 (History), February 16, 1955.

Robert Cyrus Griffith, B.A. '25, December 17, 1953.

James Carney Hardman, '16–'17 (Arts), November 27, 1954.

John Warton Harris, M.D. '16, House Staff '16–'20, FAC. '18–'28, January 14, 1955.

George Benjamin Hussey, PH.D. '87 (Greek), August 7, 1952.

Charles G. Hutzler, B.A. '24, May 17, 1955.

A. Walter Kraus, Jr., B.A. '37, May 11, 1955.

Thomas M. Landy, B.A. '23, March 22, 1955.

Sylvan Hayes Laucheimer, B.A. '90, G. '90–'91 (History), April 17, 1955.

Chester Frederich Leonard, G. '26–'27 (Education), January 17, 1952.

Benjamin Everett Lewis, '09–'10 (Arts), April 22, 1955.

Thomas Joseph Love, G. '31–'32 (Physics), January 2, 1955.

Marvin McDugald McLean, M.D. '27, FAC. '29–'30, December 31, 1954.

John Baptist Manganella, '47–'50 (Arts), July 12, 1953.

Thornley Wiley Martin, '22–'25 (Engineering), May 1, 1955.

Ruth Bennett Morgan, M.D. '04, March 10, 1955.

Telford Ira Moore, House Staff '36–'37 (Ophthalmology), August 14, 1952.

Beverly Ober, G. '11–'12 (Chemistry), April 7, 1955.

Augustus Edmund Sattler, B.A. '13, May 11, 1955.

Samuel Martin Seidlin, FAC. '23–'26, House Staff '26–'27, January 2, 1955.

Isaac Keller Shank, '26–'27, '29–'30 (McCoy), May 21, 1954.

B. Holly Smith, B.A. '06, G. '08–'09 (Bacteriology), March 23, 1955.

Levin Johnson Sothoron, Jr., '21–'22 (Engineering), April 3, 1951.

Thomas P. Sprunt, M.D. '09, assistant professor emeritus of medicine, April 26, 1955.

George A. Stewart, B.A. '07, M.D. '11, FAC. '21–'50, assistant professor emeritus of surgery, April 23, 1955.

Ellen A. Stone, M.D. '00, February 19, 1952.

Charles Francis Svec, '22–'24 (Engineering), March 18, 1955.

Francis M. Teeple, M.P.H. '46, April 19, 1955.

Harry Vernon Thomas, M.D. '25, April 21, 1955.

John Richard Watson, '29–'30, '36–'39, '49–'52 (McCoy), January 3, 1954.

The Revolution In Drug Therapy

Continued from page 3

what we now call antibiotics for the treatment of various bacterial diseases. Many believed it would be impossible to find a specific drug for the bacterial infectious diseases.

Paul Ehrlich, who coined the term chemotherapy, after many failures introduced in 1910 an organic arsenical drug, Salvarsan, as a specific cure for syphilis. This was the first man-made chemical to be successful for the treatment of an infectious disease in man. A year later, a drug related to quinine, ethylhydrocuprein, was found to cure pneumococcus septicemia in mice. However, the curative dose was very near the lethal one, and this remedy when tried in pneumonia in man was found too toxic to be given in sufficient dosage for effective therapy.

In the decade of the thirties, the first successful chemotherapeutic agents against bacterial infections in the human were introduced. These were sulfanilamide and its derivatives, the so-called sulfa drugs. That sulfanilamide was a specific cure for certain infectious diseases in human beings was early proved by incontrovertible evidence. Streptococcus meningitis, an inflammation of certain lining membranes of the brain, was almost invariably fatal before the introduction of the sulfa drugs. Enough cases were quickly treated with sulfanilamide to show that mortality could be markedly reduced. In French Nigeria, in the early sulfanilamide days, a violent epidemic of meningococcus meningitis occurred. The French physicians did not have enough of the drug available to treat all the patients. Among those who were not treated with sulfanilamide there was a mortality of 74.6 per cent, whereas in several hundred individuals treated with sulfanilamide the mortality was only 10.7 per cent.

The sulfa drugs changed the whole outlook on the prognosis of bacterial infectious diseases. Pneumonia was no longer the "captain of the men of death," and many fatal bacterial diseases were now curable in a large percentage of instances. However, these drugs were not ideal; the best of them caused minor toxic symptoms and sometimes toxic symptoms which are of serious import for the patient. In spite of this, the introduction of the sulfa drugs for the treatment of bacterial disease marked a period really "epochal in the history of medicine."

However, further advances were made in the last decade in the introduction of the so-called antibiotics. An antibiotic may be defined as an antiparasitic substance obtained from a microorganism. That the idea of using such a substance is not new has already been stated.

In 1929, Fleming found that a mold which had accidentally contaminated a culture of staphylococci prevented the growth of the bacteria in the regions where the mold was growing. He isolated the mold and found that the fluid in which it was grown had antibacterial properties *in vitro*. He also named the active principal penicillin. A decade later, Florey and his associates at Oxford reported that an extract could be prepared from the fluid in which mold was grown which exhibited marked chemotherapeutic properties in certain bacterial infections of mice. They also carried out the first treatments with penicillin in bacterial infections in man.

The first demonstration of the possible clinical value of penicillin required about twenty-five gallons of the fluid in which the mold was grown to treat one patient for one day. The question immediately arose as to the practical preparation of the material even if it had a marked therapeutic value. The answer was not long in coming and can be given in the following figures. In 1943, only eighty pounds of penicillin were produced, and the cost was twenty dollars for one grain of the material. In 1953, the production was 720,000 pounds and the cost had dropped to four cents for one grain. This was a remarkable achievement from 1941, when difficulties were encountered in producing enough penicillin to treat a single patient.

We may inquire how penicillin differs

Advertisement

Notice to Alumni

Johns Hopkins people find the Marco Polo Shop, 109 W. Saratoga St. in Baltimore, a rewarding place to visit in search of unusual handmade jewelry in a price range from $2.00 to $25.00. The shop has been noted since 1923 for its old Chinese art, lamps and minor decors.

MU 5-2726 *Emmet White*

The Revolution In Drug Therapy

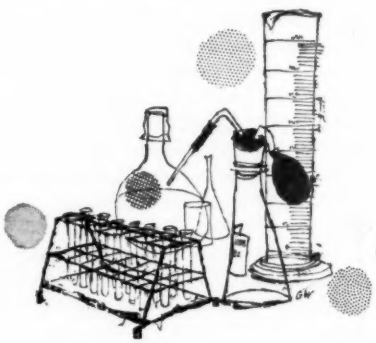
Continued from page 13

from and can be considered superior to the sulfa drugs. In the first place, it appears to be inherently non-toxic for the patient and equally good or much better for many bacterial diseases than the sulfa drugs. Unfortunately, a certain number of individuals develop allergic reactions to penicillin, many of which are serious, and a few of which prove fatal. The other property of penicillin which differentiates it from the sulfa drugs is the fact that it is an effective chemotherapeutic agent for syphilis.

The triumph of penicillin over syphilis (and gonorrhea) is a beautiful illustration of the mistaken notion that giving a large amount of money for investigations to cure some specific disease will quickly accomplish the purpose. Ehrlich's introduction of Salvarsan (or arsphenamine) as a cure of syphilis in 1910 was not followed by any real advance in the treatment of the disease until the introduction of penicillin, despite the expenditure of a large amount of money for its control and cure. The Ehrlich treatment lasted eighteen months, during which time many patients grew weary and stopped treatment. Today, with penicillin, a single injection of a preparation of penicillin can accomplish as much or more for the cure of syphilis as the eighteen months' regime inaugurated by Ehrlich. This is a truly phenomenal revolution in drug therapy. However, one must realize that this therapeutic triumph over syphilis came not from planning and voting dollars to find a better cure for the disease, but from the accident of Fleming's curiosity about the mold in his staphylococcus culture and Florey's attempt to obtain a better antibacterial agent than the sulfa drugs.

Since penicillin is effective against bacteria which are gram-positive (those which can be stained a deep violet-blue under certain conditions) and not in general on gram-negative organisms, it was natural for investigators to attempt to find the counterpart of penicillin which would act on the gram-negative bacteria. A number of impure antibiotics were tested before one was found which appeared to offer possibilities against the gram-negative organisms. This was streptothricin, which was effective both in the test-tube and in the mouse. However, it proved too toxic for clinical use. This work led to the introduction of streptomycin, from the fungus, *Streptomyces griseus*, as a chemotherapeutic agent effective against gram-negative organisms. However, the fact that streptomycin is the counterpart of penicillin on bacteria is overshadowed by the unexpected finding that it is effective against the germ of tuberculosis—a finding just as accidental as that of the efficacy of penicillin against the treponema of syphilis.

It was soon found that streptomycin was not the final answer to the chemotherapy of tuberculosis. Two other drugs—both synthetic and not antibiotics—have now been found to have an effect on and are used in this disease. These are para-aminosalicylic acid



(PAS) and isoniazid. The use of streptomycin in combination with either of these drugs is more effective than when used alone.

Now we come to the so-called broad-spectrum antibiotics—those effective against a number of bacteria, both gram-positive and gram-negative. Chloramphenicol, the first of these, was developed as an anti-tuberculous agent. Failing in this respect, it was accidentally found to be effective against rickettsia—intracellular organisms between bacteria and viruses. Hence it is effective against typhus and Rocky Mountain spotted fever. Other broad-spectrum antibiotics which have come into therapeutic use are the tetracycline sisters—tetracycline, chlortetracycline (aureomycin) and oxytetracycline (terramycin). Other antibiotics, not broad-spectrum, have come into use, such as erythromycin, which in its coverage is similar to penicillin.

One may ask, What do the sulfa drugs and antibiotic agents do in therapy? In the past two decades, we find the mortality rate from lobar pneumonia has dropped from twenty-five to four per cent, from meningococcal meningitis from thirty-three to four per cent, and from endocarditis from one hundred to twenty-two per cent. Again, comparing mortality in World War I with that in World War II, we find that deaths from wounds fell from 8.1 to 3.3 per cent; from meningitis, thirty-eight to four; from pneumonia, twenty-eight to 0.7; from dysentery, 1.6 to 0.05. This reduction in mortality is only part of the story of chemotherapeutic success; rapid recovery from infections with a short period of morbidity is equally important.

The large number of antibacterial agents having more or less the same therapeutic action serves two purposes: avoidance of the use of an agent to which an individual has become sensitized and use of another drug for one to which bacteria have become resistant. These two factors of sensitization of an individual to a drug and the drug-resistance acquired by bacteria demand that our new chemotherapeutic drugs should be used only when one has definite indications for their use.

We cannot leave the impression that it is only in the bacterial diseases that chemotherapy has triumphed in the last four decades. Mention has already been made of the effectiveness of some of the new remedies against the treponema of syphilis and rickettsia of typhus and Rocky Mountain spotted fever—organisms not too far removed from the bacteria.

We can give one example of advances in therapy of protozoan diseases—the real control of malaria by chemotherapeutic agents. Quinine was supposed for a long time to be a curative agent for malaria. It was only in World War I that observations carried out on British soldiers contracting malaria and receiving quinine showed that it suppressed the disease but did not cure it. When the Japanese overran the Dutch East Indies, over ninety-five per cent of the quinine was removed from the Allied Powers. When the United States entered World War II, the only antimalarial agent available was quinacrine (or Atabrine), a drug developed and introduced into therapy by the Germans in 1932.

An extensive program of research in the chemotherapy of malaria was carried out from 1941 to 1945 by a large group of investigators supported mainly by the committee on medical research of the Office of Scientific Research and Development. This program involved

coöperation with industrial firms and with the Army, Navy, and U. S. Public Health Service. Close coördination was attempted between the synthesis of new compounds, pharmacological and experimental therapeutic investigations of these compounds in animals, and the clinical trial in human malaria of selected compounds under carefully controlled conditions. Controlled studies led to the demonstration of the superiority of quinacrine to quinine. They also showed that neither of these drugs would completely eradicate an infection of vivax malaria but that quinacrine would radically cure an infection of falciparum malaria. Studies attempting to find drugs superior to quinines and quinacrine led to the testing of over fourteen thousand chemicals in various malarial infections of canaries, young ducks, chicks, and turkey poults. In our laboratory alone over sixty thousand young ducks were used. In addition, studies on the toxicity and pharmacology of many of the above chemicals were made in animals, and the potentialities of about one hundred chemicals were explored in human malarias produced in volunteers by parasites of the South Pacific as well as of domestic origin.

As a result of the above effort, two promising chemicals with different antimalarial actions have been introduced in the war against malarial infections. The first, chloroquine, is superior to quinacrine in a number of ways. Effective suppression of malaria can be obtained by administering it no more frequently than once weekly in a well-tolerated dose. It will cause an abrupt termination of the clinical attack of vivax malaria but not cure it, and will cure falciparum malaria when administered for one or two days. In addition, it does not stain the skin or produce gastrointestinal disturbances. The second, pentaquine, when given with large doses of quinine for two weeks, will cure vivax malaria of both domestic and South Pacific origin. It can only be used when the patient is in the hospital under observation on account of potential toxic properties.

An extension of this work has led to the introduction of primaquine to replace pentaquine. This drug can be given on an ambulatory basis. Soldiers returning from Korea were treated for two days with chloroquine and for fourteen days with primaquine. This treatment reduced the relapse rate from about forty per cent to less than one-tenth of one per cent—a remarkable accomplishment.

HERE'S SUMMER! Outdoor living, long weekends, and vacation. "And a chance to get some reading done," say many of our friends.

The habit of packing a box of books in the trunk of a vacation-bound car is a happy one, we think. But what sort of book is best for vacation reading? There's only one answer: a *variety*! Some serious books—books that you have been promising yourself you would read if ever you had the chance. (*Now's* the chance!) And something light, too—something, perhaps, in which you can read a page or two and then put it down until another opportunity comes along. (This is an ideal procedure when you're waiting for the next ferryboat to come or for the customs inspector to get around to looking through your bags.)

How does one select such a variety of books? *Our* advice is, visit the Hopkins Bookstore and browse through our hundreds and hundreds of paper-backed volumes. They cost next to nothing (and thus you can stock up with an ample supply even for a long sea voyage), they're lightweight and fit easily into the pocket of a sport jacket (and thus you've a book wherever you go), and if you lend one to a friend who hasn't finished by the time you must say goodbye, you can, in a grand yet inexpensive gesture of generosity, tell him to keep it; your compliments.

Drop by, soon. We are on the ground floor of Gilman Hall, next to the Hopkins branch of the First National Bank.

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ANVIL	EVERGREEN	SIGNET
BANTAM	MENTOR	VIKING
BEACON	MERIDIAN	VINTAGE
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The Diving Scientists

Continued from page 6

his eyes, take his reading, and then grope some more to refasten the flashlight securely. It is so dark down there that even if a diver descends with a strong automobile spotlight, attached to the boat above by an electric cable, he can just make out his own flippers in its beam.

Once on the bottom, the diver attaches his line to the weighted end of the line from the boat and swims about his business. Sometimes he is in search of an experimental oyster bed with its shells painted red for easier visibility. Sometimes he is orienting equipment that has been placed on tripods at the bottom—a hydrophone, for instance, which should be turned a certain way in relation to salinity and temperature recorders. Sometimes he is inserting rods in the bottom to establish a check on sedimentation. Or he may be taking a water sample or simply determining what the bottom is like.

Dr. Pritchard says that if he were subject to claustrophobia, he would get it severely on those days when he can't see his hand in front of his face, when he has lost all sense of direction, can't tell which way the current is taking him, and has no way of knowing what may lie directly ahead. Another of the divers describes it as "weird," with the sense of the unknown pressing in from all sides and, in winter, the added thought that at any moment a sharp shell may slash open the rubber suit, bringing a rush of numbing water.

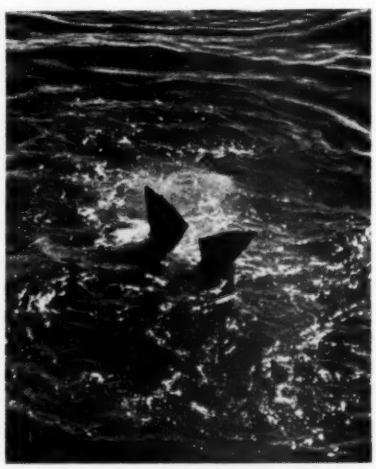
Yet the divers keep on diving, going through the long preliminary ritual of donning the cumbersome clothing, including foam-rubber socks, then attaching the right number of weights on their belts to achieve natural buoyancy (up to thirty pounds for some men), and finally getting in the water and working out the last of the air trapped inside their suits. When they can see a little, it is all right; they have even taken down an underwater camera and flashbulbs and got a few shots of the bottom. But usually it is a business of groping blindly in the mud, until the object under observation is nose-length away.

Dr. Pritchard says it can only be described as hard work.

WERNER WOLFF, BLACK STAR

In waterproof case, a camera is handed over the side to a diver.

THE frogmen have already learned some things of interest about the oyster. Whereas, for example, students of the oyster from Professor Brooks on down have believed that the oyster always lies on its left side ("The difference between the right and left shells of the oyster has a very profound significance," Dr. Brooks wrote), underwater observations have shown that some oysters lie on their right sides and apparently thrive. And whereas it has always been believed that sediment smothers oysters, divers have found them completely submerged in mud except for a small slit.



WERNER WOLFF, BLACK STAR

The flippers of a Hopkins frogman disappear beneath the Bay.

As Dr. Pritchard explains, the adaptation of free-diving techniques to the study of underwater organisms and to the work of such agencies as the Maryland and Virginia fisheries departments and the Federal Fish and Wildlife Service is as yet only in the experimental stage. Dr. Pritchard sees in free diving a method of spot-checking on oyster productivity throughout the Bay, and on such possibly disturbing factors as storms, new dredging methods, heavy run-offs of fresh water, and changes in chemical content. He also sees diving as a way of testing the accuracy of the methods currently employed in taking an oyster census.

THE Institute is working on diving only as one aspect of a varied attack on the problems of oyster cultivation, and the oyster, in turn, is only one facet of a study of the Chesapeake Bay as a whole: its physics, its chemistry, and its organisms. Professor Brooks summed up the dream and the reality back at the turn of the century when he wrote:

"Man will some day assert his dominion over the fishes of the sea, and will learn to send out flocks and herds of domesticated marine animals to pasture and fatten upon the vegetable life of the ocean and to make a vast wealth of food available. But at present we are able to do little more than to snatch a slight tribute from the stream of nutritive material which is flowing down into the ocean, as it comes to temporary rest in the valleys of our great rivers."

Nobody around the Chesapeake Bay Institute is heard at present talking of the possibilities of domesticating schools of shad or striped bass. The goal now, as in Professor Brooks' time, is to put to better use the rich farmland lying at the bottom of the Bay. And now, as then, the oyster is the most promising crop.

The current expectation of Hopkins men is that the day will come when they will know enough about the Chesapeake Bay to predict when and where oysters will emit their eggs, in what directions those eggs and subsequent larvae will be carried by the currents, and at which locations the larvae will have the best chance of survival as sedentary mollusks. Given that knowledge, oyster farming on a large scale would become a practical, profitable addition to man's store of food.

THE SPORTS YEAR

A summary of Johns Hopkins varsity results, 1954-1955

FOOTBALL

Franklin & Marshall	41;	Hopkins	13
Carnegie Tech	25;	Hopkins	0
Hopkins	14;	Hampden-Sidney	13
Randolph-Macon	27;	Hopkins	0
Drexel	26;	Hopkins	0
Hopkins	20;	Swarthmore	17
Dickinson	13;	Hopkins	6
West. Maryland	12;	Hopkins	7

SOCCER

Hopkins	4;	Gettysburg	1
Towson	3;	Hopkins	0
Bucknell	3;	Hopkins	1
Drexel	5;	Hopkins	1
Hopkins	1;	Loyola	1
Hopkins	3;	Washington	1
Hopkins	3;	Delaware	1
Hopkins	2;	West. Maryland	2
Maryland	3;	Hopkins	0

CROSS COUNTRY

Hopkins	15;	Loyola	50
Catholic	21;	Hopkins	36
Delaware	16;	Hopkins	39
Hopkins	24;	Franklin & Marshall	37
Hopkins	26;	Swarthmore	29
Hopkins	23;	Washington	34

BASKETBALL

Hopkins	81;	Swarthmore	79
Dickinson	73;	Hopkins	59
Gettysburg	86;	Hopkins	66
Hopkins	84;	Delaware	73
Hopkins	85;	Towson	77
Hopkins	103;	Randolph Macon	69
Towson	86;	Hopkins	64
Washington	82;	Hopkins	73
Rutgers	102;	Hopkins	84
Loyola	75;	Hopkins	61
Hopkins	73;	West. Maryland	67
Catholic	80;	Hopkins	71
Hampden-Sidney	85;	Hopkins	73
Loyola	108;	Hopkins	63
West. Maryland	87;	Hopkins	84

FENCING

Hopkins	17;	Temple	10
Illinois	16;	Hopkins	11
Navy	21;	Hopkins	6
Pennsylvania	17;	Hopkins	10
Hopkins	14;	Haverford	13

Johns Hopkins won the Middle Atlantic collegiate championships.

WRESTLING

Hopkins	18;	Towson	16
Delaware	21;	Hopkins	11
Hopkins	28;	Loyola	8
Swarthmore	21;	Hopkins	13

LACROSSE

Hopkins	14;	Harvard	0
Yale	6;	Hopkins	5
Rutgers	12;	Hopkins	2
Princeton	6;	Hopkins	5
Hopkins	23;	Virginia	9
Hopkins	13;	Loyola	0
Hopkins	10;	R.P.I.	6
Navy	13;	Hopkins	3
Maryland	11;	Hopkins	5

TENNIS

Hopkins	7;	American	2
Hopkins	6;	Delaware	3
Hopkins	8;	Towson	1
West. Maryland	6;	Hopkins	3
Loyola	6;	Hopkins	3
Hopkins	6;	Washington	3
Maryland	6;	Hopkins	0
West. Maryland	7;	Hopkins	2
Loyola	9;	Hopkins	0

BASEBALL

Hopkins	13;	M.I.T.	1
Hopkins	9;	American	1
Ursinus	3;	Hopkins	2
Hopkins	5;	Towson	3
Delaware	5;	Hopkins	1
Gettysburg	9;	Hopkins	1
Hopkins	3;	Swarthmore	2
Hopkins	13;	Catholic	0
West. Maryland	32;	Hopkins	3
Washington	6;	Hopkins	0
Loyola	14;	Hopkins	2
Maryland	6;	Hopkins	1
Loyola	7;	Hopkins	1

GOLF

Dartmouth	8;	Hopkins	1
Hopkins	6;	West. Maryland	3
Franklin & Marshall	5;	Hopkins	4
Delaware	6½;	Hopkins	2½
Hopkins	6½;	Gettysburg	2½
Maryland	9;	Hopkins	0
Loyola	7½;	Hopkins	1½
Hopkins	5;	Juniata	4

Johns Hopkins took fourth place in the Western Maryland Invitational Tournament and third place in the Mason-Dixon Championships.

TRACK

Swarthmore	77;	Hopkins	49
Gettysburg	72½;	Hopkins	53½
Catholic	69;	Hopkins	52
Delaware	79;	Hopkins	47
Hopkins	87;	Loyola	30

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